WETLAND ASSESSMENT REPORTS

WESP data and reports for Sandy Lake and Sackville River Watershed

Abstract

Reports and scores for WESP assessments completed at 6 sites in June – August 2020. Report completed for Sandy Lake Conservation Association by Ducks Unlimited Canada staff.

Ducks Unlimited Canada
6080 Young Street | Suite 310
Halifax, NS
B3K 5L2

Contents

Introduction to Wetland Ecosystem Services Protocol (WESP) for Atlantic Canada

What is WESP?

WESP-AC (Wetland Ecosystem Services Protocol for Atlantic Canada) is a standardized method for rapidly assessing important natural functions of wetlands in Atlantic Canada. It was originally developed in western North America by Dr. Paul Adamus at Oregon State University.

Why is it used?

Wetlands are complex systems. Detailed wetland studies can be resource- and time-intensive. Conversely, one trained professional can use WESP to rapidly assess a wetland for 18 functions and benefits.

How is it used?

WESP consists of a field and office component. Practitioners visit the wetland and answer a series of questions relating to the site vegetation, hydrology and public use. The office component is a series of questions relating to site location. Responses are recorded in an Excel spreadsheet that automatically calculates a score for each function and benefit. These scores rank the wetland on its ability to deliver each function relative to other wetlands in the province.

Who uses WESP-AC?

WESP practitioners have received specialized training to use this tool. They generally work for consultants, government or conservation organization and have a background in wetland plants, soils and hydrology.

WESP data is used by provincial and municipal governments in Atlantic Canada as well as conservation organizations such as DUC to understand various wetland and watershed dynamics, including: which functions are represented by wetlands in an area, and whether restored wetlands are adequately replacing or compensating for functions that have been lost through wetland alteration or in-filling.

What is the difference between a function and a benefit score?

Function scores refer to the wetland's ability to deliver that function based on its structure, vegetation and hydrology. Benefit scores refer to the wetland's value for the people and wildlife in the watershed and are based off its location in the watershed surrounding the land use.

What do the scores and ratings mean?

Scores are calculated based on the answers inputted into the spreadsheet and calculations made by the model that reflect our understanding of which physical characteristics are representative of a wetland's ability to deliver the specified function. Scores are adjusted to be relative to other wetlands in the province. Ratings are Low, Moderate and High. WESP-AC is calibrated for each province in Atlantic Canada based data collected from over 100 sites in each province. Scores and ratings are relative to other wetlands in Nova Scotia, therefore a "High" rating means that relative to other Nova Scotia wetlands, this wetland is highly beneficial or functional.

What can I do with this information?

WESP data has limitations. Like any model of a complex natural system, it is only an approximation of what is occurring. However, it can be used to give an idea of the functions and benefits of the wetland relative to the other wetlands in the area. This information may be useful in making land-use decisions or directing further study.

Looking for more information?

This report was prepared by staff at Ducks Unlimited Canada. For more information, please contact:

Emma Bocking, Conservation Programs Specialist

E_bocking@ducks.ca

Site Reports

Site Name: Marsh Lake **Site Code**: HRM_ 11
Date of Field Assessment: 06/22/2020
Assessors: Emma Bocking & Coastal Action staff
PID: 00648139 **GPS Coordinates**: 44.7434645, -63.6934167
Wetland Type: Fen **Size:** 4 ha
Landowner: NS Dept. of Municipal Affairs

Site Context: The area immediately surrounding this wetland is forested. Marsh Lake is south of Lower Sackville and north of Bedford and is adjacent to Sandy Lake Regional Park. Some of the land surrounding Marsh Lake is owned by HRM, while the remainder is privately owned.

Site Summary: Marsh Lake is currently owned by the NS Department of Municipal Affairs. It is part of the Sandy Lake watershed and is an important corridor between Sandy Lake and the Sackville River for turtles, fish, birds and other wildlife. Volunteers with the Sandy Lake Conservation Association and the Sackville Rivers Association have an active interest in conserving Marsh Lake and surrounding lands and expanding the existing Sandy Lake Regional Park. In 2021, the site will be designated by DUC and the province as a Treasured Wetland of Nova Scotia. Despite its name, Marsh Lake is a wetland complex with graminoid fen, shallow open water and treed bog.

Function/ Benefit	Score/ Rating	Description
Top Functions		
Waterbird Nesting Habitat	Higher	This wetland has habitat features that support a diversity and abundance of nesting waterbird species, such as ducks, shorebirds, seabirds or herons. Such habitat features could include surface water, intermediate aquatic plant cover, mild water level fluctuation, tree snags and a wide vegetated buffer.
Anadromous Fish Habitat	Higher	Not only is there evidence that this wetland is accessible to anadromous fish, several features of the wetland indicate that the structure, productivity and hydrologic regime are suitable for anadromous fish species. Natural land cover surrounding the wetland the absence of human-related stressors also contributes to favorable fish habitat.
Waterbird Feeding Habitat	Higher	This wetland has habitat features that support a diversity and abundance of feeding waterbird species, such as ducks and shorebirds, particularly as a stopover site during migration or for overwintering. Such habitat features include nearby ponds or lakes, food and nutrient availability, a flat surface, ponded water and plenty of emergent vegetation cover. There are likely minimal stressors that are harmful for waterbirds, including high concentrations of metals and other contaminants.
Top Benefits		
Invertebrate Habitat	Higher	A high benefit score implies that this wetland is also great habitat for fish, waterbirds and songbirds and mammals, all of which are supported by and benefit from healthy invertebrate species.
Water Storage and Delay	Higher	This wetland is in an area where people and infrastructure are at risk from non-tidal flooding. Wetlands in these areas with high benefit scores provide the ecosystem service of flood regulation.
Nitrate Removal and Retention	Higher	High concentrations of nitrate in aquatic systems can lead to toxic algal blooms that are harmful to people and wildlife. There may be domestic wells nearby, or a tributary is present that would transport soluble nitrates out of the wetland. In addition, there may be potential sources of nitrogen in the area from agriculture, urban areas or septic systems.

Ducks Unlimited Canada
Conserving Canada's Wetlands

Site Name: David's Marsh **Site Code**: HRM_17
Date of Field Assessment: 06/24/2020
Assessors: Emma Bocking & Coastal Action staff
PIDs: 40202806; 00422857
GPS Coordinates: 44.73965, -63.71891
Wetland Type: Fen **Size:** 0.5 ha
Landowner(s): Sandy Lake Holdings Ltd; 3063063 Nova Scotia Limited

Site Context: David's Marsh has a forested buffer. Beyond this buffer, there is some disturbance from clear-cutting and suburban residential development. The land is owned by Sandy Lake Holdings and is zoned residential. Volunteers with the Sandy Lake Conservation Association are actively seeking additional protection for this site. Karen's Brook runs through the wetland.

Site Summary: After doing a preliminary prioritization attempt of the WESP sites completed in 2020, this wetland had the highest average score. As a peatland it has high carbon sequestration potential; the watercourse provides good transport of nutrients to downstream systems, and good fish habitat. Its relative vegetative uniqueness compared to surrounding land uses makes it good wildlife habitat. The presence of downstream infrastructure vulnerable to flooding increases the benefit of this wetland for water storage and delay.

Function/ Benefit	Score/ Rating	Description
Top Functions		
Pollinator Habitat	Higher	This wetland has habitat features that support pollinating insects and birds. It is likely to contain a diversity of flowering plants, and suitable nesting habitat such as tree snags, ground cover, downed wood, large trees and/or cliffs. The wetland is not persistently flooded.
Waterbird Nesting Habitat	Higher	This wetland has habitat features that support a diversity and abundance of nesting waterbird species, such as ducks, shorebirds, seabirds or herons. Such habitat features could include surface water, intermediate aquatic plant cover, mild water level fluctuation, tree snags and a wide vegetated buffer.
Songbird, Raptor and Mammal Habitat	Higher	This wetland has habitat features that support a diversity and abundance of songbirds, raptors and mammals. Such habitat features could include a mix of open water and land cover, a wide vegetated buffer, tree snags, downed wood, varied microtopography, mature trees and diverse shrub cover.
Top Benefits		
Water Storage & Delay	Higher	This wetland is in an area where people and infrastructure are at risk from non-tidal flooding. Wetlands in these areas with high benefit scores provide the ecosystem service of flood regulation.
Songbird, Raptor and Mammal Habitat	Higher	This wetland is recognized as an IBA (Important Bird Area) or is known to support a rare breeding waterbird species. It may also be one of the few herbaceous or wooded wetlands locally.
Waterbird Feeding Habitat	Higher	This wetland may be recognized as an Important Bird Area or is known to host a rare migratory waterbird species. Alternatively, it may also be one of the few herbaceous wetlands or ponds in the local area, and/or it has the potential to have a high value for recreationists including birdwatchers and waterfowl hunters due its proximity to public roads and population centers.

Site Name: Jack Lake **Site Code**: HRM_18
Date of Field Assessment: 06/24/2020
Assessors: Emma Bocking & Coastal Action staff & Molly LeBlanc (Coastal Action).
PID: 40857138 **GPS Coordinates**: 44.73960, -63.71887
Wetland Type: Fen **Size:** 0.4 ha
Landowner: Halifax Regional Municipality

Site Context: Jack Lake is surrounded by forest and is in Sandy Lake Regional Park. Beyond the forest is a 100 series highway, and a heavily populated suburb. There is a sand pit located near the lake, that is used by off road vehicles.

Site Summary: The wetland was assessed at the outflow of Jack Lake. Its very high organic nutrient export score and location of the wetland near the top of the watershed is critical for nourishing downstream ecosystems. Given the numerous sources of nitrogen from surrounding development, the wetland's nitrate removal and retention capability is greatly beneficial. Features of the wetland including its relative seclusion and the surrounding, partly old-growth, mixed Acadian forest provide excellent bird habitat and corridors or turtles and other herptiles. This site has a high recreation value with a boardwalk and an existing trail leading to the lake. Sandy Lake Conservation Association volunteers are pursuing further protection for this site and surrounding areas via the expanded Sandy Lake Regional Park.

Function/ Benefit	Score/ Rating	Description
Top Functions		
Organic Nutrient Export	Higher	This wetland is effective as producing, cycling and exporting organic matter downstream. Organic nutrients exported from wetlands like this one, provide essential support for downstream estuarine food webs. Wetlands that provide this function have a surface water outflow and soil with high organic carbon content (e.g. peat).
Songbird, Raptor and Mammal Habitat	Higher	This wetland has habitat features that support a diversity and abundance of songbirds, raptors and mammals. Such habitat features could include a mix of open water and land cover, a wide vegetated buffer, tree snags, downed wood, varied microtopography, mature trees and diverse shrub cover.
Pollinator Habitat	Higher	This wetland has habitat features that support pollinating insects and birds. It is likely to contain a diversity of flowering plants, and suitable nesting habitat such as tree snags, ground cover, downed wood, large trees and/or cliffs. The wetland is not persistently flooded.
Top Benefits		
Nitrate Removal & Retention	Higher	High concentrations of nitrate in aquatic systems can lead to toxic algal blooms that are harmful to people and wildlife. There may be domestic wells nearby, or a tributary is present that would transport soluble nitrates out of the wetland. In addition, there may be potential sources of nitrogen in the area from agriculture, urban areas or septic systems.
Amphibian & Turtle Habitat	Higher	This wetland may be known to support a regionally rare amphibian or turtle species. Additionally, it may provide herbaceous or woody cover that is lacking in the surrounding landscape, and provide habitat for birds and mammals, which are supported by healthy amphibian and turtle populations.
Waterbird Feeding Habitat	Higher	This wetland may be recognized as an Important Bird Area or is known to host a rare migratory waterbird species. Alternatively, it may also be one of the few herbaceous wetlands or ponds in the local area, and/or it has the potential to have a high value for recreationists including irdwatchers and waterfowl hunters due its proximity to public roads and population centers.

Ducks Unlimited Canada
Conserving Canada's Wetlands

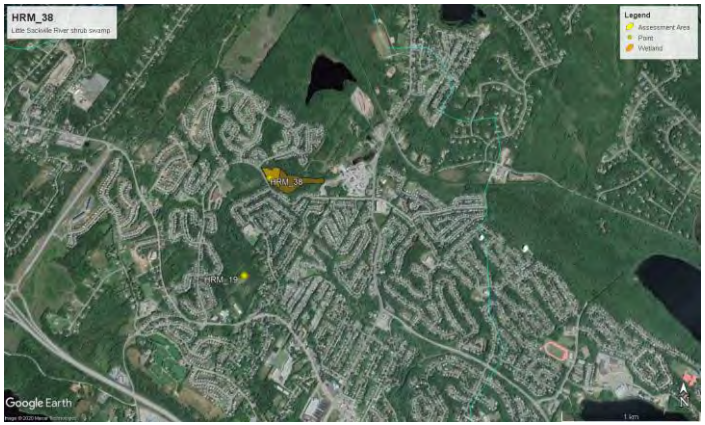
Site Name: Little Sackville River **Site Code**: HRM_19
Date of Field Assessment: 06/24/2020
Assessor: Emma Bocking & Izzy Clarke
PID: 40109068 **GPS Coordinates**: 44.784648, -63.704914
Wetland Type: Size: Swamp
Landowner: Valleyfield Farm Ltd.

Site Context: Little Sackville River is in the centre of a dense residential area in Lower Sackville. There is a small patch of trees in the area. Located nearby are subdivisions, and two schools (Millwood Elementary and Millwood Highschool).

Site Summary: Almost all the Benefit scores for this site are rated 'Higher', indicating the importance of this wetland in the watershed. Intensive development in the catchment area increases the relative importance of this wetland to store water, retain nutrients and sediments, and provide wildlife habitat. The Sackville River is known to support populations of anadromous and other fish (11 species total), so this wetland plays an important function in providing fish habitat. It is one of only two watersheds in HRM with a mapped floodplain, which indicates known risks to infrastructure when there are flooded conditions. This known risk increases the Water storage and delay benefit of wetlands in the watershed.

Function/ Benefit	Score/ Rating	Description
Top Functions		
Resident Fish Habitat	Higher	This wetland has habitat features that support a diversity and abundance of native resident fish. Such habitat features could include connectivity with the surrounding waterscape, high nutrient and oxygen availability, suitable vegetation cover and shade, and few known stressors such as toxic contaminants.
Anadromous Fish Habitat	Higher	Not only is there evidence that this wetland is accessible to anadromous fish, several features of the wetland indicate that the structure, productivity and hydrologic regime are suitable for anadromous fish species. Natural land cover surrounding the wetland the absence of human-related stressors also contributes to favorable fish habitat.
Waterbird Feeding Habitat	Higher	This wetland has habitat features that support a diversity and abundance of feeding waterbird species, such as ducks and shorebirds, particularly as a stopover site during migration or for overwintering. Such habitat features include nearby ponds or lakes, food and nutrient availability, a flat surface, ponded water and plenty of emergent vegetation cover. There are likely minimal stressors that are harmful for waterbirds, including high concentrations of metals and other contaminants.
Top Benefits		
Water Storage & Delay	Higher	This wetland is in an area where people and infrastructure are at risk from non-tidal flooding. Wetlands in these areas with high benefit scores provide the ecosystem service of flood regulation.
Pollinator Habitat	Higher	This wetland may contain a rare plant species. Additionally, it may contain some of the only herbaceous or woody vegetation within the local area.
Nitrate Removal & Retention	Higher	High concentrations of nitrate in aquatic systems can lead to toxic algal blooms that are harmful to people and wildlife. There may be domestic wells nearby, or a tributary is present that would transport soluble nitrates out of the wetland. In addition, there may be potential sources of nitrogen in the area from agriculture, urban areas or septic systems.

Site Name: Lower Sackville shrub swamp
Site Code: HRM_38
Date of Field Assessment: 07/16/2020
Assessor: Emma Bocking
PID: 40669392
GPS Coordinates: 44.79174, -63.70281
Wetland Type: Swamp
Size: 1.5 ha
Landowner: Halifax Regional Municipality



Site Context: The area immediately surrounding this wetland is treed. Beyond the wooded area (mix of shrub and trees) there is the densely populated community of Lower Sackville. Highways 101 and 102 are nearby.

Site Summary: Almost all the Benefit scores for this site are rated 'Higher', indicating the importance of this wetland in the watershed. Intensive development in the catchment area increases the relative importance of this wetland to store water, retain nutrients and sediments, and provide wildlife habitat. The Sackville River is known to support populations of anadromous and other fish (11 species total), so this wetland plays an important function in providing fish habitat. It is one of only two watersheds in HRM with a mapped floodplain, which indicates known risks to infrastructure when there are flooded conditions. This known risk increases the Water storage and delay benefit of wetlands in the watershed.

Function/ Benefit	Score/ Rating	Description
Top Functions		
Organic Nutrient Export	Higher	This wetland is effective as producing, cycling and exporting organic matter downstream. Organic nutrients exported from wetlands like this one, provide essential support for downstream estuarine food webs. Wetlands that provide this function have a surface water outflow and soil with high organic carbon content (e.g. peat).
Water Cooling	Higher	This wetland is effective at maintaining or reducing the temperature of surface water, particularly in headwater streams. This is a more common function in wetlands that contain deep, flowing surface water that is shaded.
Songbird, Raptor & Mammal Habitat	Higher	This wetland has habitat features that support a diversity and abundance of songbirds, raptors and mammals. Such habitat features could include a mix of open water and land cover, a wide vegetated buffer, tree snags, downed wood, varied microtopography, mature trees and diverse shrub cover.
Top Benefits		
Water Storage & Delay	Higher	This wetland is in an area where people and infrastructure are at risk from non-tidal flooding. Wetlands in these areas with high benefit scores provide the ecosystem service of flood regulation.
Waterbird Feeding Habitat	Higher	This wetland may be recognized as an Important Bird Area or is known to host a rare migratory waterbird species. Alternatively, it may also be one of the few herbaceous wetlands or ponds in the local area, and/or it has the potential to have a high value for recreationists including birdwatchers and waterfowl hunters due its proximity to public roads and population centers.
Pollinator Habitat	Higher	This wetland may contain a rare plant species. Additionally, it may contain some of the only herbaceous or woody vegetation within the local area.

Ducks Unlimited Canada
Conserving Canada's Wetlands

Site Name: West Bedford Triangle **Site Code**: HRM_39
Date of Field Assessment: 08/20/2020
Assessors: Emma Bocking
PIDs: 00645960 **GPS Coordinates**: 44.719742, -63.723352
Wetland Type: Swamp **Size:** 0.4 ha
Landowner(s): West Bedford Holdings Ltd.

Site Context: West Bedford Triangle is a small wetland in a small forested area bordered by Hammonds Plains Rd and Larry Uteck Blvd. Some houses border the wetland, and there is an industrial park within 1 km.

Site Summary: This is an easily, small riparian marsh located in a suburban area. It includes habitat features for animals and would be an excellent place to spot birds, mammals, herptiles, and pollinators. The wetland protects surrounding infrastructure and waterways from potential flooding and contamination by storing and delaying water and supporting good water quality. Nearby development, including the road bordering the wetland in the southwest are causes of stress for this wetland and are vehicles of frequent input of contaminants, salts, and nutrients into the marsh.

Function/ Benefit	Score/ Rating	Description
Top Functions		
Songbird, Raptor & Mammal Habitat	Higher	This wetland has habitat features that support a diversity and abundance of songbirds, raptors and mammals. Such habitat features could include a mix of open water and land cover, a wide vegetated buffer, tree snags, downed wood, varied microtopography, mature trees and diverse shrub cover.
Organic Nutrient Export	Higher	This wetland is effective as producing, cycling and exporting organic matter downstream. Organic nutrients exported from wetlands like this one, provide essential support for downstream estuarine food webs. Wetlands that provide this function have a surface water outflow and soil with high organic carbon content (e.g. peat).
Pollinator Habitat	Higher	This wetland has habitat features that support pollinating insects and birds. It is likely to contain a diversity of flowering plants, and suitable nesting habitat such as tree snags, ground cover, downed wood, large trees and/or cliffs. The wetland is not persistently flooded.
Top Benefits		
Water Storage & Delay	Higher	This wetland is in an area where people and infrastructure are at risk from non-tidal flooding. Wetlands in these areas with high benefit scores provide the ecosystem service of flood regulation.
Amphibian & Turtle Habitat	Higher	This wetland may be known to support a regionally rare amphibian or turtle species. Additionally, it may provide herbaceous or woody cover that is lacking in the surrounding landscape, and provide habitat for birds and mammals, which are supported by healthy amphibian and turtle populations.
Pollinator Habitat	Higher	This wetland may contain a rare plant species. Additionally, it may contain some of the only herbaceous or woody vegetation within the local area.

Appendix A: Pictures

Figure 1: HRM 11 (Marsh Lake)

Figure 2: HRM 17 (David's Marsh)

Figure 3: HRM 18 (Jack Lake)

Figure 4: HRM 19 (Little Sackville River 1)

Figure 5: HRM 38 (Little Sackville River 2)

Figure 6: HRM 39 (West Bedford wetland)

Appendix B: WESP Scores

HRM 11

Wetland Functions or Other Attributes:	Function Score (Normalised)	Function Rating	Benefits Score (Normalised)	Benefits Rating
Water Storage & Delay (WS)	2.52	Lower	10.00	Higher
Stream Flow Support (SFS)	7.59	Higher	5.71	Moderate
Water Cooling (WC)	4.71	Higher	9.40	Higher
Sediment Retention & Stabilisation (SR)	5.16	Moderate	8.33	Higher
Phosphorus Retention (PR)	3.68	Lower	7.93	Higher
Nitrate Removal & Retention (NR)	3.06	Moderate	10.00	Higher
Carbon Sequestration (CS)	5.14	Moderate		
Organic Nutrient Export (OE)	7.49	Higher		
Anadromous Fish Habitat (FA)	10.00	Higher	4.11	Moderate
Resident Fish Habitat (FR)	8.33	Higher	3.85	Moderate
Aquatic Invertebrate Habitat (INV)	8.63	Higher	10.00	Higher
Amphibian & Turtle Habitat (AM)	7.30	Higher	10.00	Higher
Waterbird Feeding Habitat (WBF)	10.00	Higher	10.00	Higher
Waterbird Nesting Habitat (WBN)	10.00	Higher	10.00	Higher
Songbird, Raptor, & Mammal Habitat (SBM)	6.02	Moderate	10.00	Higher
Pollinator Habitat (POL)	7.36	Moderate	10.00	Higher
Native Plant Habitat (PH)	6.10	Higher	7.09	Moderate
Public Use & Recognition (PU)			7.10	Higher
Wetland Sensitivity (Sens)			2.06	Lower
Wetland Ecological Condition (EC)			4.78	Moderate
Wetland Stressors (STR) (higher score means more stress)			5.94	Moderate
Summary Ratings for Grouped Functions:				
HYDROLOGIC Group (WS)	2.52	Lower	10.00	Higher
WATER QUALITY SUPPORT Group (max+avg/2 of SR, PR, NR, CS)	4.56	Moderate	9.38	Higher
AQUATIC SUPPORT Group (max+avg/2 of SFS, INV, OE, WC)	7.87	Higher	9.19	Higher
AQUATIC HABITAT Group (max+avg/2 of FA, FR, AM, WBF, WBN)	9.56	Higher	8.80	Higher
TRANSITION HABITAT Group (max+avg/2 of SBM, PH, POL)	6.93	Moderate	9.52	Higher
WETLAND CONDITION (EC)			4.78	Moderate
WETLAND RISK (average of Sensitivity & Stressors)			4.00	Moderate

Wetland Functions or Other Attributes:	Function Score (Normalised)	Function Rating	Benefits Score (Normalised)	Benefits Rating
Water Storage & Delay (WS)	1.49	Lower	10.00	Higher
Stream Flow Support (SFS)	7.24	Higher	5.96	Moderate
Water Cooling (WC)	7.40	Higher	8.97	Higher
Sediment Retention & Stabilisation (SR)	4.58	Moderate	10.00	Higher
Phosphorus Retention (PR)	4.05	Lower	10.00	Higher
Nitrate Removal & Retention (NR)	3.08	Moderate	10.00	Higher
Carbon Sequestration (CS)	4.16	Moderate		
Organic Nutrient Export (OE)	7.14	Higher		
Anadromous Fish Habitat (FA)	6.46	Higher	5.46	Higher
Resident Fish Habitat (FR)	7.82	Higher	5.54	Higher
Aquatic Invertebrate Habitat (INV)	7.49	Higher	8.34	Higher
Amphibian & Turtle Habitat (AM)	4.62	Moderate	10.00	Higher
Waterbird Feeding Habitat (WBF)	6.96	Higher	10.00	Higher
Waterbird Nesting Habitat (WBN)	8.07	Higher	10.00	Higher
Songbird, Raptor, & Mammal Habitat (SBM)	9.61	Higher	10.00	Higher
Pollinator Habitat (POL)	7.87	Moderate	10.00	Higher
Native Plant Habitat (PH)	7.31	Higher	8.27	Higher
Public Use & Recognition (PU)			5.98	Higher
Wetland Sensitivity (Sens)			5.34	Moderate
Wetland Ecological Condition (EC)			6.52	Higher
Wetland Stressors (STR) (higher score means more stress)			4.79	Moderate
Summary Ratings for Grouped Functions:				
HYDROLOGIC Group (WS)	1.49	Lower	10.00	Higher
WATER QUALITY SUPPORT Group (max+avg/2 of SR, PR, NR, CS)	4.24	Lower	10.00	Higher
AQUATIC SUPPORT Group (max+avg/2 of SFS, INV, OE, WC)	7.40	Higher	8.36	Higher
AQUATIC HABITAT Group (max+avg/2 of FA, FR, AM, WBF, WBN)	7.43	Higher	9.10	Higher
TRANSITION HABITAT Group (max+avg/2 of SBM, PH, POL)	8.94	Higher	9.71	Higher
WETLAND CONDITION (EC)			6.52	Higher
WETLAND RISK (average of Sensitivity & Stressors)			5.07	Moderate

HRM 18

	Function Score (Normalised)	Function Rating	Benefits Score (Normalised)	Benefits Rating
Water Storage & Delay (WS)	0.35	Lower	5.87	Moderate
Stream Flow Support (SFS)	5.52	Higher	6.62	Higher
Water Cooling (WC)	6.30	Higher	4.16	Moderate
Sediment Retention & Stabilisation (SR)	2.78	Lower	0.65	Lower
Phosphorus Retention (PR)	4.37	Lower	0.43	Lower
Nitrate Removal & Retention (NR)	1.81	Lower	10.00	Higher
Carbon Sequestration (CS)	4.45	Moderate		
Organic Nutrient Export (OE)	9.88	Higher		
Anadromous Fish Habitat (FA)	0.00	Lower	0.00	Lower
Resident Fish Habitat (FR)	7.48	Higher	6.69	Higher
Aquatic Invertebrate Habitat (INV)	5.47	Higher	6.67	Higher
Amphibian & Turtle Habitat (AM)	4.59	Moderate	10.00	Higher
Waterbird Feeding Habitat (WBF)	7.31	Higher	10.00	Higher
Waterbird Nesting Habitat (WBN)	7.51	Higher	10.00	Higher
Songbird, Raptor, & Mammal Habitat (SBM)	8.93	Higher	10.00	Higher
Pollinator Habitat (POL)	8.19	Higher	10.00	Higher
Native Plant Habitat (PH)	4.48	Moderate	8.16	Higher
Public Use & Recognition (PU)			10.00	Higher
Wetland Sensitivity (Sens)			3.42	Lower
Wetland Ecological Condition (EC)			4.78	Moderate
Wetland Stressors (STR) (higher score means more stress)			5.34	Moderate
Summary Ratings for Grouped Functions:				
HYDROLOGIC Group (WS)	0.35	Lower	5.87	Moderate
WATER QUALITY SUPPORT Group (max+avg/2 of SR, PR, NR, CS)	3.68	Lower	6.85	Higher
AQUATIC SUPPORT Group (max+avg/2 of SFS, INV, OE, WC)	8.34	Higher	6.24	Higher
AQUATIC HABITAT Group (max+avg/2 of FA, FR, AM, WBF, WBN)	6.44	Higher	8.67	Higher
TRANSITION HABITAT Group (max+avg/2 of SBM, PH, POL)	8.07	Higher	9.69	Higher
WETLAND CONDITION (EC)			4.78	Moderate
WETLAND RISK (average of Sensitivity & Stressors)			4.38	Moderate

Wetland Functions or Other Attributes:	Function Score (Normalised)	Function Rating	Benefits Score (Normalised)	Benefits Rating
Water Storage & Delay (WS)	2.21	Lower	10.00	Higher
Stream Flow Support (SFS)	4.07	Moderate	5.52	Moderate
Water Cooling (WC)	6.54	Higher	9.96	Higher
Sediment Retention & Stabilisation (SR)	3.59	Lower	10.00	Higher
Phosphorus Retention (PR)	1.64	Lower	10.00	Higher
Nitrate Removal & Retention (NR)	4.45	Moderate	10.00	Higher
Carbon Sequestration (CS)	1.36	Lower		
Organic Nutrient Export (OE)	4.98	Moderate		
Anadromous Fish Habitat (FA)	7.06	Higher	5.46	Higher
Resident Fish Habitat (FR)	7.23	Higher	5.55	Higher
Aquatic Invertebrate Habitat (INV)	3.03	Moderate	6.34	Higher
Amphibian & Turtle Habitat (AM)	5.50	Moderate	5.58	Higher
Waterbird Feeding Habitat (WBF)	6.97	Higher	10.00	Higher
Waterbird Nesting Habitat (WBN)	4.13	Moderate	10.00	Higher
Songbird, Raptor, & Mammal Habitat (SBM)	5.12	Moderate	10.00	Higher
Pollinator Habitat (POL)	5.39	Moderate	10.00	Higher
Native Plant Habitat (PH)	2.07	Lower	6.29	Moderate
Public Use & Recognition (PU)			5.46	Higher
Wetland Sensitivity (Sens)			2.71	Lower
Wetland Ecological Condition (EC)			4.78	Moderate
Wetland Stressors (STR) (higher score means more stress)			9.19	Higher
Summary Ratings for Grouped Functions:				
HYDROLOGIC Group (WS)	2.21	Lower	10.00	Higher
WATER QUALITY SUPPORT Group (max+avg/2 of SR, PR, NR, CS)	3.60	Lower	10.00	Higher
AQUATIC SUPPORT Group (max+avg/2 of SFS, INV, OE, WC)	5.60	Moderate	8.61	Higher
AQUATIC HABITAT Group (max+avg/2 of FA, FR, AM, WBF, WBN)	6.70	Higher	8.66	Higher
TRANSITION HABITAT Group (max+avg/2 of SBM, PH, POL)	4.79	Moderate	9.38	Higher
WETLAND CONDITION (EC)			4.78	Moderate
WETLAND RISK (average of Sensitivity & Stressors)			5.95	Higher

Wetland Functions or Other Attributes:	Function Score (Normalised)	Function Rating	Benefits Score (Normalised)	Benefits Rating
Water Storage & Delay (WS)	2.60	Lower	10.00	Higher
Stream Flow Support (SFS)	3.93	Moderate	5.04	Moderate
Water Cooling (WC)	8.30	Higher	9.51	Higher
Sediment Retention & Stabilisation (SR)	3.75	Lower	10.00	Higher
Phosphorus Retention (PR)	1.05	Lower	10.00	Higher
Nitrate Removal & Retention (NR)	3.02	Moderate	10.00	Higher
Carbon Sequestration (CS)	0.91	Lower		
Organic Nutrient Export (OE)	9.20	Higher		
Anadromous Fish Habitat (FA)	6.26	Higher	5.79	Higher
Resident Fish Habitat (FR)	6.13	Higher	5.89	Higher
Aquatic Invertebrate Habitat (INV)	0.34	Lower	6.30	Higher
Amphibian & Turtle Habitat (AM)	3.51	Lower	6.26	Higher
Waterbird Feeding Habitat (WBF)	5.75	Moderate	10.00	Higher
Waterbird Nesting Habitat (WBN)	4.76	Moderate	10.00	Higher
Songbird, Raptor, & Mammal Habitat (SBM)	8.03	Higher	10.00	Higher
Pollinator Habitat (POL)	7.22	Moderate	10.00	Higher
Native Plant Habitat (PH)	2.79	Lower	7.63	Moderate
Public Use & Recognition (PU)			7.69	Higher
Wetland Sensitivity (Sens)			3.89	Moderate
Wetland Ecological Condition (EC)			0.00	Lower
Wetland Stressors (STR) (higher score means more stress)			10.00	Higher
Summary Ratings for Grouped Functions:				
HYDROLOGIC Group (WS)	2.60	Lower	10.00	Higher
WATER QUALITY SUPPORT Group (max+avg/2 of SR, PR, NR, CS)	2.97	Lower	10.00	Higher
AQUATIC SUPPORT Group (max+avg/2 of SFS, INV, OE, WC)	7.32	Higher	8.23	Higher
AQUATIC HABITAT Group (max+avg/2 of FA, FR, AM, WBF, WBN)	5.77	Moderate	8.79	Higher
TRANSITION HABITAT Group (max+avg/2 of SBM, PH, POL)	7.02	Moderate	9.61	Higher
WETLAND CONDITION (EC)			0.00	Lower
WETLAND RISK (average of Sensitivity & Stressors)			6.94	Higher

HRM 39

Wetland Functions or Other Attributes:	Function Score (Normalised)	Function Rating	Benefits Score (Normalised)	Benefits Rating
Water Storage & Delay (WS)	2.33	Lower	10.00	Higher
Stream Flow Support (SFS)	4.34	Moderate	4.79	Moderate
Water Cooling (WC)	4.67	Moderate	2.96	Moderate
Sediment Retention & Stabilisation (SR)	3.03	Lower	10.00	Higher
Phosphorus Retention (PR)	0.00	Lower	10.00	Higher
Nitrate Removal & Retention (NR)	2.75	Moderate	10.00	Higher
Carbon Sequestration (CS)	1.28	Lower		
Organic Nutrient Export (OE)	6.90	Moderate		
Anadromous Fish Habitat (FA)	0.00	Lower	0.00	Lower
Resident Fish Habitat (FR)	5.39	Moderate	4.98	Higher
Aquatic Invertebrate Habitat (INV)	3.83	Moderate	4.96	Moderate
Amphibian & Turtle Habitat (AM)	5.28	Moderate	10.00	Higher
Waterbird Feeding Habitat (WBF)	5.52	Moderate	10.00	Higher
Waterbird Nesting Habitat (WBN)	3.60	Moderate	10.00	Higher
Songbird, Raptor, & Mammal Habitat (SBM)	8.58	Higher	10.00	Higher
Pollinator Habitat (POL)	6.67	Moderate	10.00	Higher
Native Plant Habitat (PH)	2.33	Lower	7.64	Moderate
Public Use & Recognition (PU)			1.35	Lower
Wetland Sensitivity (Sens)			3.99	Moderate
Wetland Ecological Condition (EC)			4.78	Moderate
Wetland Stressors (STR) (higher score means more stress)			6.92	Higher
Summary Ratings for Grouped Functions:				
HYDROLOGIC Group (WS)	2.33	Lower	10.00	Higher
WATER QUALITY SUPPORT Group (max+avg/2 of SR, PR, NR, CS)	2.40	Lower	10.00	Higher
AQUATIC SUPPORT Group (max+avg/2 of SFS, INV, OE, WC)	5.92	Moderate	4.60	Moderate
AQUATIC HABITAT Group (max+avg/2 of FA, FR, AM, WBF, WBN)	4.74	Moderate	8.50	Higher
TRANSITION HABITAT Group (max+avg/2 of SBM, PH, POL)	7.22	Higher	9.61	Higher
WETLAND CONDITION (EC)			4.78	Moderate
WETLAND RISK (average of Sensitivity & Stressors)			5.45	Moderate